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VERIFICATION OF TRANSLATION

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declare that I am well acquainted with both the German and English languages, and that the attached is an accurate translation, to the best of my knowledge and ability, of the German language Patent Application No. 100 03 686.4, filed January 28, 2000.

I further declare that all statements made herein of my knowledge are true and that all statements made on information and belief are believed to be true; and, further, that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of ~~ited~~ States Code and that such willful false statements may jeopardize the validity of the ~~plication~~ application or any trademark issued thereon.

Date 10/31/02

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Machine and Process for Producing a Tissue Web

The invention relates to a machine for producing a tissue web having a forming area including at least one rotating continuous dewatering wire. It further relates to a process according to the preamble of claim 15.

Previous attempts have been made to influence the quality parameters of a tissue web, such as, e.g., water absorption capacity, water retention capacity, and water absorption rate, by configuring the surface structure of the web. The prior art (cf., e.g., US 5 746 887, US 5 492 598, SE 427053) suggests using "embossing wires" or "embossing felts". These wires or felts emboss their own surface structure onto the already formed tissue web. In this process, the tissue web is loaded with pressure, which counteracts the desired high volume (bulk). At the same time, this process requires a high expenditure for machinery since the embossing wires are used for this purpose alone. These processes are frequently also combined with special, expensive drying processes to increase the specific volume.

The object of the invention is to create a machine and a process of the type mentioned at the outset with which the construction and the structure, i.e., the arrangement of the fibers, of a tissue web can be configured, in particular even at high machine speeds, so that the water absorption capacity, water retention capacity, water absorption rate, and specific volume (bulk) are increased or improved in as cost-effective a manner as possible.

With respect to the tissue machine, this object is achieved according to the invention in that at least one dewatering wire with zonally varied wire permeability, i.e., a so-called DSP wire, is provided in the forming area, as well as at least one shoe press.

Due to this configuration, areas of high dewatering speed and areas of low dewatering speed are created in the sheet forming zone during the dewatering process. Thus, a tissue

web is produced with zonally varied fiber percentages, as a result of which the water absorption of the web is increased and also proceeds at a faster rate. This influences the tissue web not only at the sheet surface, but over the total sheet volume, as a result of which the quality parameters improve considerably. The use of a DSP wire in combination with a shoe press has the particular advantage that, with the gentle pressing dewatering achieved by the shoe press, the advantageous structure in the tissue web for improving the water absorption capacity, water retention capacity, and water absorption rate is maintained and at the same time a voluminous web of high specific volume (bulk) is attained.

Wires of zonally varied permeability are known, for example, from SE 427053. According to this publication, the wires in question can comprise, e.g., a fabric in which longitudinal and transverse yarns provided in one or more planes in accordance with a specified pattern are woven together so that systematically distributed areas of suitable size are formed in which the number of points of intersection is zero or distinctly fewer than in the woven structure of the remaining fabric.

A preferred practical embodiment of the machine according to the invention includes a former with two rotating continuous dewatering belts that converge, forming a flow box gap, and are then conducted over a forming element such as, in particular, a forming roll, with a dewatering wire with zonally varied wire permeability being provided as an outer belt not coming into contact with the forming element and/or as an inner belt.

In certain cases, it is advantageous for the shoe press to be provided as a separate unit in the web travel direction behind the unit including the forming element and the two dewatering belts. The shoe press can thus be provided, in particular, as a free-standing press.

In an alternative embodiment of the machine according to the invention, the tissue web carried by one of the two dewatering belts subsequent to the forming element, is conducted through the shoe press together with this dewatering belt.

As an opposing element to the shoe press unit, it is advisable for the shoe press to include a drying cylinder, preferably a Yankee cylinder.

The shoe press unit can be constructed, for example, as described in EP 99 125 789. According to this publication, the shoe press unit can have, for example, a press nip whose length, viewed in the web travel direction, is less than or equal to a value of about 60 mm and whose pressure profile along the length of the press nip has a maximum pressing pressure greater than or equal to a value of about 3.3 MPa ("shortshoe"). With such a shoe press unit, it is possible to achieve as high a solids content and/or specific volume as possible, while largely maintaining the quality features required for the produced web.

According to an alternative embodiment likewise described in EP 99 125 789, the shoe press unit can have a press nip whose length, viewed in the belt travel direction, is greater than a value of about 80 mm and preferably less than 200 mm, in particular a maximum of 150 mm, and whose pressure profile over the length of the press nip has a maximum pressing pressure less than or equal to a value of about 2 MPa ("longshoe"). By these means, the web is dewatered in a particularly gentle manner and, in combination with a DSP wire, a particularly high bulk is achieved. The web gains a higher water absorption capacity thereby. A further positive effect is that the water is absorbed more rapidly.

The shoe press unit can otherwise be constructed, for example, as described in EP 99 125 789.

In certain cases, it can also be advantageous for a drying zone to be provided in which the tissue web can be acted upon at least partially by pressurized displacement gas (TAD, Through Air Drying).

According to a useful embodiment, a twin wire-former can be provided, for example, as the former. A dewatering wire with zonally varied wire permeability, i.e., a "DSP wire," can be provided here as an outer belt and/or as an inner belt. If only one of the two belts is formed by such a DSP wire, the other belt can be a conventional dewatering wire for tissue.

In a useful alternative embodiment, a crescent former is provided as the former, whose outer belt is formed by a dewatering wire with zonally varied wire permeability and whose inner belt is formed by a felt belt.

The maximum extension of the surface of the partial areas of the dewatering wire with zonally varied wire permeability is advisably $Az < 5$ mm, preferably $Az < 3$ mm.

It is also advantageous for the dewatering wire with zonally varied wire permeability to not be pinned with felt-like fibers, but rather to comprise a fabric formed by shute and warp yarns, i.e., to comprise only shute and warp yarns.

The zones of varied wire permeability of an applicable dewatering belt are advantageously produced using weaving yarns of varied diameter and/or varied weave pattern.

Advantageously, the dewatering wire with zonally varied wire permeability is used in an area in which the solids content of the tissue web is less than about 20% and, in particular, less than about 12%, and it is preferably used in the initial sheet forming area at a solids content of less than about 6%.

Since, owing to the varied permeability, fibers can penetrate into the volume of the wire and lodge there, it is preferable for a conditioning device such as, in particular, a wire cleaning device to be assigned to the dewatering wire of zonally varied wire permeability. For example, spray pipes with nozzles distributed over the machine width can be provided thereby. A Voith Sulzer "Duocleaner" with rotating high pressure nozzles and integrated suction extractor or a Voith Sulzer "Jet Cleaner" can also be used, for example, however.

The process according to the invention is correspondingly characterized in that at least one dewatering wire with zonally varied wire permeability is used in the forming area, as well as at least one shoe press.

Advantageous embodiments of the process according to the invention are given in the subclaims.

Suitable as wires of zonally varied permeability are, for example, wires of the type described in PCT/GB99/02684. According to this, the wires in question can comprise in particular a fabric in which yarns provided in one or more planes and running in a first direction are woven together with yarns running in a second direction in such a way that a grid is formed that separates a number of systematically distributed areas of specified configuration from one another and fixes them accordingly, with the systematically distributed areas each including at least three yarns running in the one direction and at least three yarns running in the other direction. The yarns can be in particular shute yarns and warp yarns.

The invention is explained in more detail below based on exemplary embodiments with reference to the drawings, which show:

Figure 1 A schematic representation of a twin wire former of a machine for producing a tissue web, in which a dewatering wire with zonally varied wire permeability is provided as an outer belt and/or as an inner belt, and this so-called DSP wire is used in combination with a free-standing shoe press,

Figure 2 A schematic representation of a crescent former, in which a dewatering wire with zonally varied wire permeability is provided as an outer belt and a felt belt is provided as an inner belt, and in which subsequent to the forming roll the tissue web carried by the felt belt is conducted together with this felt belt through a shoe press,

Figure 3 A schematic representation of a former resulting from a combination of the two formers shown in Figures 1 and 2, and

Figure 4 A weave pattern diagram of a repeating section of a dewatering wire with zonally varied wire permeability formed by a woven fabric.

The formers 10 shown in Figures 1 and 2 are each part of a machine for producing a tissue web 12. In the forming area, preferably in the initial dewatering area, at least one dewatering wire with zonally varied wire permeability, i.e., a DSP wire, is provided respectively. This DSP wire is provided respectively in combination with a shoe press.

The two formers 10 each include two continuous rotating dewatering belts 14, 16 that converge, forming a flow box gap 18, and are subsequently conducted over a forming element, here formed by a forming roll 20.

The fibrous suspension is introduced into the flow box gap 18 by means of a headbox 22.

Figure 1 shows in schematic representation a twin-wire former 10 in which a wire is provided respectively as an inner belt 14 coming into contact with the forming roll 20 and also as an outer belt.

At least one of the two dewatering wires 14, 16 is provided as a wire with zonally varied wire permeability, i.e., as a DSP wire. Here, a conditioning device, such as, in particular, a wire cleaning device 50, can be assigned to each DSP wire (cf. Figure 2).

In the present case, the fibrous suspension delivered by the headbox 22 is sprayed from diagonally below into the flow box gap 18 formed between the two dewatering belts 14, 16. The outer belt 16 coming from below is conducted over a deflection roll 24 past the headbox 22 to the forming roll 20 and from there is conducted back again over a further deflection roll 26.

The two dewatering belts 14, 16 are again separated from one another in the area of the forming roll 20. The inner belt 14 is conducted back again over a deflection roll 28. In the belt travel direction L before the deflection roll 28, the tissue web is taken over from the inner belt 14 by a waterproof belt 32 in the area of a guide roll 30 and is conducted to the press nip of a shoe press 34, which includes a shoe press unit 36 below as well as an opposing roll 38 above. Besides the upper waterproof belt 32 conducting the tissue web with it, a lower felt 40 is conducted through the press nip of the shoe press 34 that is conducted over a deflection roll 42 or 44 both before and after the shoe press 34. The lower felt 40 is separated again from the waterproof belt 32 immediately after the press nip of the shoe press 34, in order to avoid a re-wetting. Subsequent to the shoe press 34, the waterproof belt 32 is conducted together with the tissue web to a transfer roll 46, in the area of which the tissue web is transferred to a tissue cylinder or Yankee cylinder 48.

In the present case, the shoe press 34 is thus provided as a separate unit in the belt travel direction L behind the unit including the forming element 20 and the two dewatering belts 14, 16.

Figure 2 shows in schematic representation a crescent former 10 in which a dewatering wire with zonally varied wire permeability, i.e., a so-called DSP wire, is provided as an outer belt 16 not coming into contact with the forming roll 20. The inner belt 14 is formed here by a felt belt. A conditioning device 50 such as in particular a wire cleaning device can be assigned to the DSP wire 16.

Subsequent to the forming roll 20, the tissue web 12 being formed is conducted jointly with the inner belt 14 to the press nip 52 of a shoe press 57, which includes a shoe press unit, here a shoe press roll 56, and a drying cylinder, preferably a Yankee cylinder 54, as an opposing element.

In the present case, the tissue web 12 carried by the inner belt 14 subsequent to the forming roll 20 is thus conducted through the shoe press 57 together with this inner belt 14 formed by a felt.

In the belt travel direction L before the press nip 52, the inner belt 14 conducting the tissue web 12 is conducted over a device provided with suction, here a suction roll 58.

A drying hood 60 can be assigned to the Yankee cylinder 54. The shoe press 34 or 57 can, for example, be constructed as described in EP 99 125 789. According to this, such a shoe press 34 or 57 can, for example, have a press nip whose length, viewed in the belt travel direction L, is less than or equal to a value of about 60 mm and whose pressure profile over the press nip length has a maximum pressing pressure greater than or equal to a value of about 3.3 MPa ("shortshoe").

According to an alternative embodiment likewise described in EP 99 125 789, the shoe press 34 or 57 can, for example, also have a press nip whose length, viewed in the belt travel direction L, is greater than a value of about 80 mm and preferably less than 200 mm, in particular a maximum of 150 mm, and whose pressure profile over the press nip length has a maximum pressing pressure less than or equal to a value of about 2 MPa ("longshoe").

The respective tissue machine can include a drying zone in which the tissue web 12 can be acted upon at least partially by pressurized displacement gas (TAD, Through Air Drying).

The respective dewatering wires with zonally varied wire permeability can comprise, for example, a fabric formed by shute and warp yarns. Here, the zones of varied wire permeability can be produced, for example, using weaving yarns of varied diameter and/or varied weave pattern.

Suitable wires of zonally varied permeability are, for example, wires of the type described in PCT/GB99/02684. According to this, the wires in question can comprise in particular a fabric in which yarns provided in one or more planes and running in a first direction are woven together with yarns running in a second direction, such that a grid is formed that separates a number of systematically distributed areas of specified configuration from one another and fixes them accordingly, with the systematically distributed areas each including at least three yarns running in the one direction and at least three yarns running in the other direction. The yarns can be in particular shute yarns and warp yarns.

Figure 3 shows a former resulting from a combination of the two formers shown in Figures 1 and 2. Corresponding parts are provided with the same reference numbers.

In the present case, the fibrous suspension delivered by the headbox 22 is also sprayed from diagonally below into the flow box gap 18 formed between the two dewatering belts 14, 16. The outer belt 16 coming from below is conducted over a deflection roll 24 past the headbox 22 to the forming roll 20 and from there is conducted back again over a further deflection roll 26.

The two dewatering belts 14, 16 are again separated from one another in the area of the forming roll 20. The inner belt 14 is conducted back again over a deflection roll 28. In the belt travel direction L before the deflection roll 28, the tissue web is taken over from the inner belt 14 by a belt 32 in the area of a deflection roll 30 and is conducted to the press nip 52 of a shoe press 57, which includes a shoe press unit, here a shoe press roll 56, and as the opposing element a drying cylinder, preferably a Yankee cylinder 54.

In the belt travel direction L before the press nip 52, the belt 32 conducting the tissue web 12 is again conducted over a device provided with suction, here a suction roll 58.

Figure 4 shows, purely by way of example, a weave pattern diagram of a repeating section of a possible embodiment of a dewatering wire with zonally varied wire permeability formed by such a fabric. In the present embodiment, the repeating weave pattern diagram includes ten warp yarns and ten shute yarns. In the area of the hatched squares, the respective shute yarn lies beneath the respective warp yarn. In the area of the light squares, on the other hand, the respective shute yarn lies above the respective warp yarn. Depending on the circumstances of each case, the one or else the other side of the weave pattern diagram can lie outside.

The hatched areas form a grid 62, by means of which ultimately a number of systematically distributed areas 64 of specified configuration are separated from one another and fixed accordingly.

List of Reference Numbers

10	Former
12	Tissue web
14	Dewatering belt, inner belt
16	Dewatering belt, outer belt
18	Flow box gap
20	Forming roll
22	Headbox
24	Deflection roll
26	Deflection roll
28	Deflection roll
30	Deflection roll
32	Waterproof belt
34	Shoe press
36	Shoe press unit
38	Opposing roll
40	Lower felt
42	Deflection roll
44	Deflection roll
46	Transfer roll
48	Tissue cylinder, Yankee cylinder
50	Conditioning device
52	Press nip
54	Yankee cylinder
56	Shoe press roll

57	Shoe press
58	Suction roll
60	Drying hood
62	Grid
64	Area
L	Belt travel direction

Claims

1. Machine for producing a tissue web (12) having a forming area including at least one rotating continuous dewatering wire (14, 16), characterized in that at least one dewatering wire (14, 16) with zonally varied wire permeability is provided in the forming area, as well as at least one shoe press (34, 57).

2. Machine according to claim 1, characterized in that it includes a former (10) with two rotating continuous dewatering belts (14, 16) that converge, forming a flow box gap (18), and are then conducted over a forming element (20) such as in particular a forming roll, and that a dewatering wire (14) with zonally varied wire permeability is provided as an outer belt (16) not coming into contact with the forming element and/or as an inner belt.

3. Machine according to claim 2, characterized in that the shoe press (34) is provided as a separate unit in the belt travel direction (L) behind the unit including the forming element (20) and the two dewatering belts (14, 16).

4. Machine according to claim 2, characterized in that the tissue web (12) carried by one of the two dewatering belts (14, 16) subsequent to the forming element (20), is conducted through the shoe press (57) together with this dewatering belt (14).

5. Machine according to one of the previous claims, characterized in that the shoe press (57) includes a shoe press unit (56) and as the opposing element a drying cylinder, preferably a Yankee cylinder (54).

6. Machine according to one of the previous claims, characterized in that the shoe press (34, 57) has a press nip whose length, viewed in the belt travel direction (L), is less

than or equal to a value of about 60 mm and whose pressure profile over the press nip length has a maximum pressing pressure greater than or equal to a value of about 3.3 MPa.

7. Machine according to one of claims 1 to 5, characterized in that the shoe press (34, 57) has a press nip whose length, viewed in the belt travel direction (L), is greater than a value of about 80 mm and preferably less than 200 mm, in particular a maximum of 150 mm, and whose pressure profile over the press nip length has a maximum pressing pressure less than or equal to a value of about 2 MPa.

8. Machine according to one of the previous claims, characterized in that it includes a drying zone in which the tissue web (12) can be acted upon at least partially by pressurized displacement gas.

9. Machine according to one of the previous claims, characterized in that at least one dewatering wire (14, 16) with zonally varied wire permeability is provided in the initial dewatering area.

10. Machine according to one of the previous claims, characterized in that a twin-wire former is provided as the former (10).

11. Machine according to one of claims 1 to 9, characterized in that a crescent former whose outer belt (16) is formed by a dewatering wire with zonally varied wire permeability and whose inner belt (14) is formed by a felt belt, is provided as the former (10).

12. Machine according to one of the previous claims, characterized in that at least one dewatering wire (14, 16) with zonally varied wire permeability is provided that comprises a fabric formed by shute and warp yarns.

13. Machine according to claim 12, characterized in that the zones of varied wire permeability of the dewatering wire (14, 16) are produced using weaving yarns of varied diameter and/or varied weave pattern.

14. Machine according to one of the previous claims, characterized in that a conditioning device (50), such as, in particular, a wire cleaning device, is assigned to the dewatering wire (14, 16) with zonally varied wire permeability.

15. Process for producing a tissue web (12) by means of a tissue machine having a forming area including at least one rotating continuous dewatering wire (14, 16), characterized in that at least one dewatering wire (14, 16) with zonally varied wire permeability is used in the forming area, as well as at least one shoe press (34, 57).

16. Process according to claim 15, characterized in that a former (10) is used with two rotating continuous dewatering belts (14, 16) that converge, forming a flow box gap (18), and are then conducted over a forming element (20), such as, in particular, a forming roll, and that a dewatering wire with zonally varied wire permeability is used as an outer belt (16) not coming into contact with the forming element (20) and/or as an inner belt (14).

17. Process according to claim 16, characterized in that as the shoe press (34), a unit is used that is separate from the unit including the forming element (20) and the two dewatering belts (14, 16) and is arranged behind in the belt travel direction (L).

18. Process according to claim 16, characterized in that the tissue web (12) carried by one of the two dewatering belts (14, 16) subsequent to the forming element (20), is conducted through the shoe press (57) together with this dewatering belt (14).

19. Process according to one of the previous claims, characterized in that the dewatering is carried out at a machine speed greater than about 1300 m/min, in particular greater than about 1500 m/min, and preferably greater than about 1800 m/min.

20. Process according to one of the previous claims, characterized in that at least one dewatering wire (14, 16) with zonally varied wire permeability is used in the initial dewatering area.

21. Process according to one of the previous claims, characterized in that a twin-wire former is used as the former (10).

22. Process according to one of claims 15 through 20, characterized in that a crescent former whose outer belt (16) is formed by a dewatering wire with zonally varied wire permeability, and whose inner belt (14) is formed by a felt belt, is used as the former (10).

23. Process according to one of the previous claims, characterized in that at least one dewatering wire (14, 16) with zonally varied wire permeability is used that consists of a fabric formed by shute and warp yarns.

24. Process according to one of the previous claims, characterized in that at least one dewatering wire (14, 16) is used whose zones of varied wire permeability are produced using weaving yarns of varied diameter and/or varied weave pattern.

25. Process according to one of the previous claims. characterized in that the dewatering wire (14. 16) with zonally varied wire permeability is used in an area in which the solids content of the tissue web (12) is less than about 20% and in particular less than about 12%, and it is preferably used in the initial sheet forming area at a solids content of less than about 6%.

Abstract

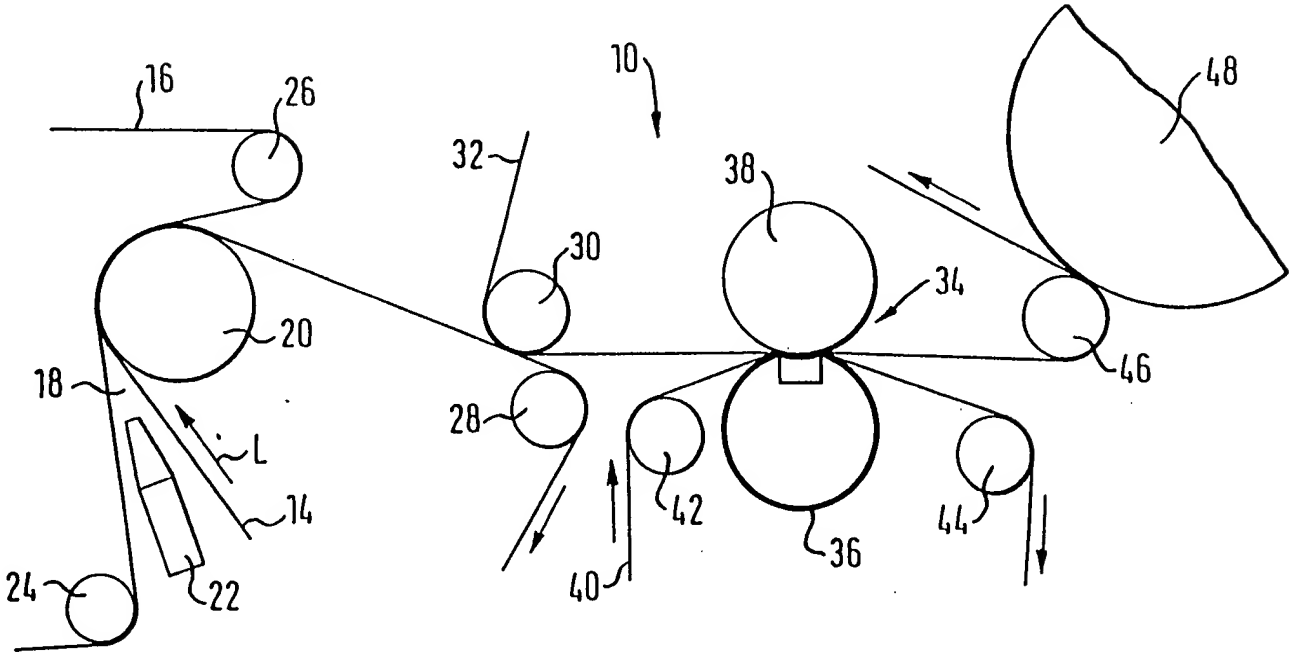
A machine for producing a tissue web 12 includes at least one rotating continuous dewatering wire 14, 16 in a forming area. At least one dewatering wire 14, 16 with zonally varied wire permeability is provided in the forming area, as well as at least one shoe press 34, 57.

(Figure 1)

Zusammenfassung

Eine Maschine zur Herstellung einer Tissuebahn 12 umfaßt in einem Formierbereich zumindest ein umlaufendes endloses Entwässerungssieb 14, 16. Dabei ist im Formierbereich wenigstens ein Entwässerungssieb 14, 16 mit zonal unterschiedlicher Siebdurchlässigkeit sowie wenigstens eine Schuhpresse 34, 57 vorgesehen.

(Figur 1)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Patentansprüche

1. Maschine zur Herstellung einer Tissuebahn (12) mit einem zumindest ein umlaufendes endloses Entwässerungssieb (14, 16) umfassenden Formierbereich,
dadurch **gekennzeichnet**,
daß im Formierbereich wenigstens ein Entwässerungssieb (14, 16) mit zonal unterschiedlicher Siebdurchlässigkeit sowie wenigstens eine Schuhpresse (34, 57) vorgesehen ist.

2. Maschine nach Anspruch 1,
dadurch **gekennzeichnet**,
daß sie einen Former (10) mit zwei umlaufenden endlosen Entwässerungsbändern (14, 16) umfaßt, die unter Bildung eines Stoffeinlaufspaltes (18) zusammenlaufen und anschließend über ein Formierelement (20) wie insbesondere eine Formierwalze geführt sind, und daß als nicht mit dem Formierelement in Kontakt tretendes Außenband (16) und/oder als Innenband ein Entwässerungssieb (14) mit zonal unterschiedlicher Siebdurchlässigkeit vorgesehen ist.

3. Maschine nach Anspruch 2,
dadurch **gekennzeichnet**,
daß die Schuhpresse (34) als getrennte Einheit in Bandlaufrichtung

(L) hinter der das Formierelement (20) und die beiden Entwässerungsbänder (14, 16) umfassenden Einheit vorgesehen ist.

4. Maschine nach Anspruch 2,
dadurch **gekennzeichnet**,
daß die im Anschluß an das Formierelement (20) durch eines der beiden Entwässerungsbänder (14, 16) mitgenommene Tissuebahn (12) zusammen mit diesem Entwässerungsband (14) durch die Schuhpresse (57) geführt ist.

5. Maschine nach einem der vorhergehenden Ansprüche,
dadurch **gekennzeichnet**,
daß die Schuhpresse (57) eine Schuhpreßeinheit (56) und als Gegenelement einen Trockenzylinder, vorzugsweise einen Yankee-Zylinder (54), umfaßt.

6. Maschine nach einem der vorhergehenden Ansprüche,
dadurch **gekennzeichnet**,
daß die Schuhpresse (34, 57) einen Preßspalt besitzt, dessen in Bandlaufrichtung (L) betrachtete Länge kleiner oder gleich einem Wert von etwa 60 mm ist und dessen sich über die Preßspaltlänge ergebendes Druckprofil einen maximalen Preßdruck aufweist, der größer oder gleich einem Wert von etwa 3,3 MPa ist.

7. Maschine nach einem der Ansprüche 1 bis 5,
dadurch **gekennzeichnet**,
daß die Schuhpresse (34, 57) einen Preßspalt besitzt, dessen in Bandlaufrichtung (L) betrachtete Länge größer als ein Wert von etwa

80 mm und vorzugsweise kleiner als 200 mm, insbesondere höchstens 150 mm, ist und dessen sich über die Preßspaltlänge ergebendes Druckprofil einen maximalen Preßdruck aufweist, der kleiner oder gleich einem Wert von etwa 2 MPa ist.

8. Maschine nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet**, daß sie eine Trocknungszone umfaßt, in der die Tissuebahn (12) zumindest teilweise durch unter Druck stehendes Verdrängungsgas beaufschlagbar ist.

9. Maschine nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet**, daß wenigstens ein Entwässerungssieb (14, 16) mit zonal unterschiedlicher Siebdurchlässigkeit im initialen Entwässerungsbereich vorgesehen ist.

10. Maschine nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet**, daß als Former (10) ein Doppelsiebformer vorgesehen ist.

11. Maschine nach einem der Ansprüche 1 bis 9, dadurch **gekennzeichnet**, daß als Former (10) ein Crescentformer vorgesehen ist, dessen Außenband (16) durch ein Entwässerungssieb mit zonal unterschiedlicher Siebdurchlässigkeit und dessen Innenband (14) durch ein Filzband gebildet ist.

12. Maschine nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet**, daß wenigstens ein Entwässerungssieb (14, 16) mit zonal unterschiedlicher Siebdurchlässigkeit vorgesehen ist, das aus einem durch Schuß- und Kettfäden gebildeten Gewebe besteht.

13. Maschine nach Anspruch 12, dadurch **gekennzeichnet**, daß die Zonen unterschiedlicher Siebdurchlässigkeit des Entwässerungssiebes (14, 16) durch die Verwendung von Webfäden unterschiedlichen Durchmessers und/oder unterschiedlichen Webmusters erzeugt sind.

14. Maschine nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet**, daß dem Entwässerungssieb (14, 16) mit zonal unterschiedlicher Siebdurchlässigkeit eine Konditioniereinrichtung (50) wie insbesondere eine Siebreinigungseinrichtung zugeordnet ist.

15. Verfahren zur Herstellung einer Tissuebahn (12) mittels einer Tissuemaschine mit einem zumindest ein umlaufendes endloses Entwässerungssieb (14, 16) umfassenden Formierbereich, dadurch **gekennzeichnet**, daß im Formierbereich wenigstens ein Entwässerungssieb (14, 16) mit zonal unterschiedlicher Siebdurchlässigkeit sowie wenigstens eine Schuhpresse (34, 57) verwendet wird.

16. Verfahren nach Anspruch 15,
dadurch **gekennzeichnet**,
daß ein Former (10) mit zwei umlaufenden endlosen Entwässerungsbändern (14, 16) verwendet wird, die unter Bildung eines Stoffeinlaufspaltes (18) zusammenlaufen und anschließend über ein Formierelement (20) wie insbesondere eine Formierwalze geführt werden, und daß als nicht mit dem Formierelement (20) in Kontakt tretendes Außenband (16) und/oder als Innenband (14) ein Entwässerungssieb mit zonal unterschiedlicher Siebdurchlässigkeit verwendet wird.

17. Verfahren nach Anspruch 16,
dadurch **gekennzeichnet**,
daß als Schuhpresse (34) eine von der das Formierelement (20) und die beiden Entwässerungsbänder (14, 16) umfassenden Einheit getrennte, in Bandlaufrichtung (L) dahinter angeordnete Einheit eingesetzt wird.

18. Verfahren nach Anspruch 16,
dadurch **gekennzeichnet**,
daß die im Anschluß an das Formierelement (20) durch eines der beiden Entwässerungsbänder (14, 16) mitgenommene Tissuebahn (12) zusammen mit diesem Entwässerungsband (14) durch die Schuhpresse (57) geführt wird.

19. Verfahren nach einem der vorhergehenden Ansprüche,
dadurch **gekennzeichnet**,
daß die Entwässerung bei einer Maschinengeschwindigkeit durch-

geführt wird, die größer als etwa 1300 m/min, insbesondere größer als etwa 1500 m/min und vorzugsweise größer als etwa 1800 m/min ist.

20. Verfahren nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet**, daß wenigstens ein Entwässerungssieb (14, 16) mit zonal unterschiedlicher Siebdurchlässigkeit im initialen Entwässerungsbereich verwendet wird.

21. Verfahren nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet**, daß als Former (10) ein Doppelsiebformer verwendet wird.

22. Verfahren nach einem der Ansprüche 15 bis 20, dadurch **gekennzeichnet**, daß als Former (10) ein Crescentformer verwendet wird, dessen Außenband (16) durch ein Entwässerungssieb mit zonal unterschiedlicher Siebdurchlässigkeit und dessen Innenband (14) durch ein Filzband gebildet ist.

23. Verfahren nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet**, daß wenigstens ein Entwässerungssieb (14, 16) mit zonal unterschiedlicher Siebdurchlässigkeit verwendet wird, das aus einem durch Schuß- und Kettfäden gebildeten Gewebe besteht.

24. Verfahren nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet**, daß wenigstens ein Entwässerungssieb (14, 16) verwendet wird, dessen Zonen unterschiedlicher Siebdurchlässigkeit durch die Verwendung von Webfäden unterschiedlichen Durchmessers und/oder unterschiedlichen Webmusters erzeugt sind.

25. Verfahren nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet**, daß das Entwässerungssieb (14, 16) mit zonal unterschiedlicher Siebdurchlässigkeit in einem Bereich, in dem der Trockengehalt der Tissuebahn (12) kleiner als etwa 20 % und insbesondere kleiner als etwa 12 % ist, und vorzugsweise im initialen Blattbildungsbereich bei einem Trockengehalt kleiner als etwa 6 % eingesetzt wird.

FIG. 1

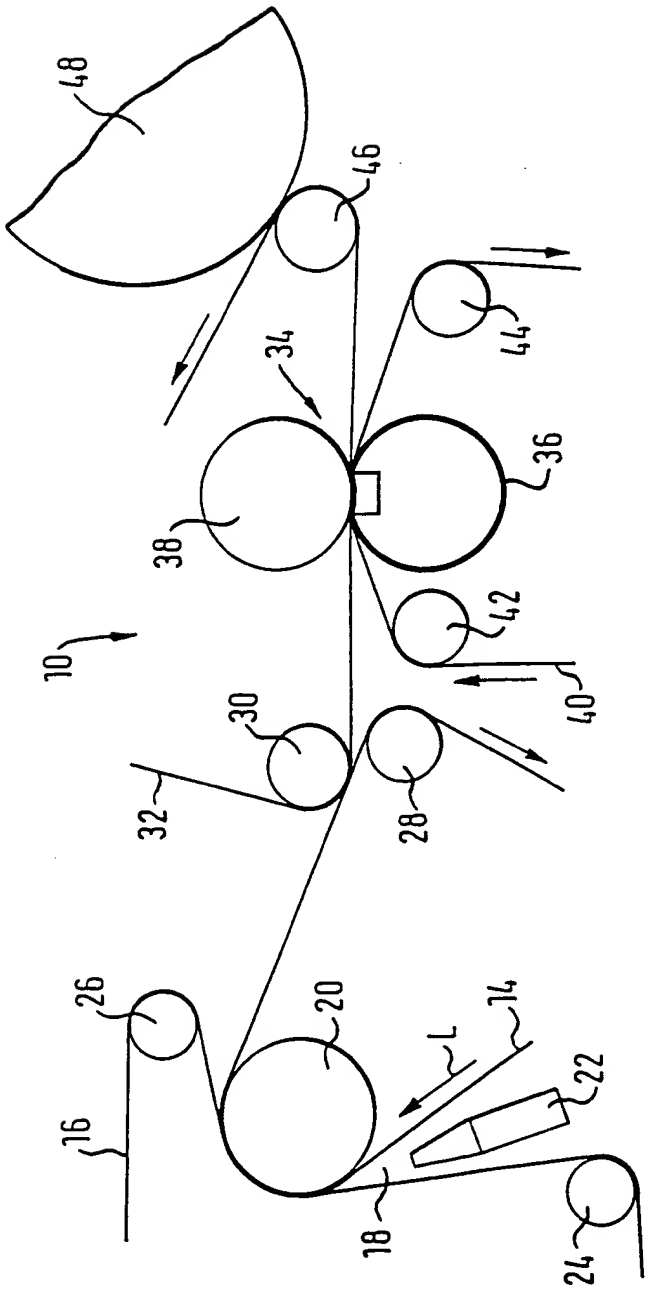

FIG. 2

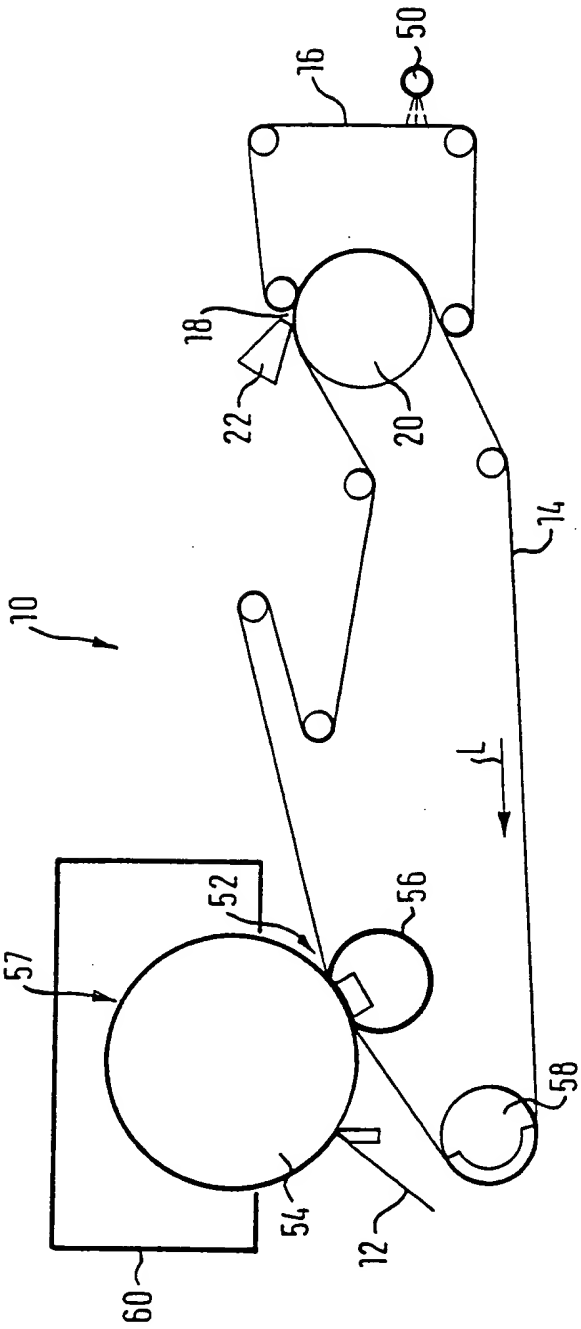

FIG. 3

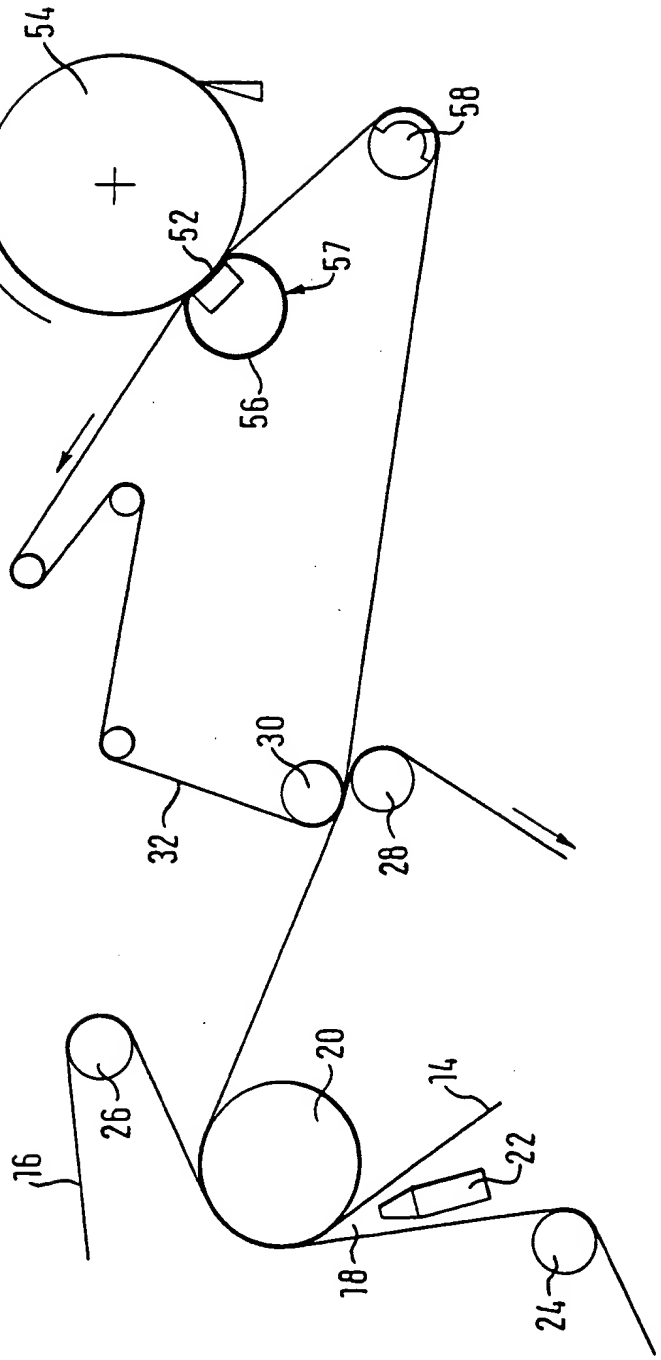

FIG. 4